



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|-----------------------|------------------|
| 09/732,506 | 12/06/2000 | Jean-Yves Bouguet | 06618/565001/CIT-3128 | 1153 |
| 20985 | 7590 | 01/24/2005 | EXAMINER | |
| FISH & RICHARDSON, PC 12390 EL CAMINO REAL SAN DIEGO, CA 92130-2081 | | | CHAWAN, SHEELA C | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2625 | |

DATE MAILED: 01/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/732,506

Applicant(s)

BOUGUET ET AL.

Examiner

Sheela C Chawan

Art Unit

2625

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 August 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6, 8- 47, 49- 64 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 8- 47, 49- 52, 54, 56, 57, 59-64 is/are rejected.
- 7) ☒ Claim(s) 53,55 and 58 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on August 11, 2004 has been entered and made of record.

Claims 7 and 48 are cancelled.

Claims 53-64 are new added claims.

Claims 1-6, 8- 47, 49-64 are pending in the application.

Response to Arguments

2. Applicant's arguments, see page 17 lines 8-9, filed August 11, 2004, with respect to the rejection(s) of claim(s) 1- 52, under 102(b) rejection have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Bouguet et al., (US. 6, 219, 063 B1).

Claim Rejections - 35 U.S.C. § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-6, 8- 47, 49- 52, 54, 56, 57, 59-64 are rejected under 35 U.S.C. 102(e)

Art Unit: 2625

as being anticipated by Bouguet et al., (US. 6,219,063 B1).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

As to claims 1 and 36, Bouguet discloses a method, comprising:

moving a shadow across a three-dimensional scene (abstract, a camera records and captures the scene of 3D surface of the object using the movement of shadow across the object scene, column 2, lines 7-12);

imaging said moving shadow by determining temporal information about the moving shadow and determining shadow information associated with times within said temporal information (a camera records and captures the scene of 3D surface of the object using the movement of shadow across the object scene, column 2, lines 7-12, column 5, lines 15- 42, 43- 46, column 6, lines 39- 46); and determining three-dimensional information about the scene from the shadow information and from the temporal information (column 2, lines 59- 66).

As to claim 2, Bouguet discloses a method wherein said imaging comprises using a camera to obtain an image of the moving shadow (column 3, lines 58- 60).

As to claim 3, Bouguet discloses a method further comprising determining a transformation between an image plane of the camera and actual plane comprising the three-dimensional scene (column 3, lines 59- 67).

As to claim 4, Bouguet discloses a method wherein said determining comprises triangulating to form information indicative of points on the three-dimensional scene (column 3, lines 44-58, column 2, lines 60-67).

As per claim 5, Bouguet discloses a method comprising an initial operation of calibrating a position of a light source (column 4, lines 39 - 49).

As to claim 6, Bouguet discloses a method further comprising an initial operation of calibrated a position of a plane on which the three-dimensional scene is located (column 4, lines 39-49).

As to claim 8, Bouguet discloses a method further comprising converting said projection into actual shadow information (column 3, lines 12-20, column 7, lines 49-57).

As to claim 9, Bouguet discloses a method wherein said calibrating a position of the light source comprises imaging an item of known height (note, depth is considered to be height of shadow) by defining a position of its shadow, and triangulating a position of the light source (column 2, lines 59- 67).

As to claims 10 and 33, Bouguet discloses a method wherein said determining comprises converting information into a dual-space representation, and calculating said information in said dual space representation (column 4, lines 38-66).

As to claims 11 and 34, Bouguet discloses a method wherein said determining comprises obtaining images of different edges at different locations, and using information about the intersection to form three-dimensional information (column 3, lines 58- 67, column 5, lines 15- 42, 56- 65).

Regarding claim 12, argument analogous those presented for claim 1 are applicable to claim 12 as discloses by Bouguet as follow determining a profile of different intensity (note intensity corresponds to brightness) portions of said moving shadow and using said profile to define an edge of said moving shadow (column 6, lines 1-65); and

converting said image using additional information, to determine actual three dimensional information about the three dimensional scene (column 7, lines 40- 56).

As to claim 13, Bouguet discloses a method wherein said additional information is a position of a light source (column 3, lines 32-34).

As to claim 14, Bouguet discloses a method, wherein said additional information is a position of a reference plane (fig 1A shows the position of reference plane, column 3, lines 25-31).

As to claim 15, Bouguet discloses a method wherein said reference plane is a single reference plane (fig 1A, column 3, lines 25-31).

As to claim 16, Bouguet discloses a method wherein said additional information about said reference plane includes a position of two different reference planes (fig 1A, shows two different reference plane, top and bottom planes, column 3, lines 25- 31).

Art Unit: 2625

As to claim 17, Bouguet discloses a method wherein said additional information is information about a shadow of unknown object of known height (column 2, lines 59-67).

As to claim 18, Bouguet discloses a method wherein said additional information is information from a second light source (column 4, lines 11-19, column 5, lines 8-15).

As to claim 19, Bouguet discloses a method wherein said additional information is information from a second shadow (note, creating at least one shadow across the surface and the object plane at any of a plurality of different random location, column 4, lines 50-67).

As to claim 20, Bouguet discloses a method further comprising a calibration operation that determines a position of the reference plane (column 2, lines 17-26).

As to claim 21, Bouguet discloses a method wherein said converting comprises converting a projection of the shadow into actual shadow information (column 2, lines 60-67).

As to claim 22, Bouguet discloses a method further comprising obtaining an object of known height, obtaining as shadow of said object, and using said shadow to determine the position of the light source (column 3, lines 59-67).

As to claim 23, Bouguet discloses a method wherein said additional information is information, which propagates between edges of the image (column 4, lines 60-67).

As to claim 24, Bouguet discloses a method wherein said shadow is formed by two separate light sources (column 3, lines 49-59, column 5, lines 8-14).

Art Unit: 2625

As to claim 25, Bouguet discloses a method wherein said converting comprises defining said shadow as a set of edges C, and a set of intersection points p_k (column 5, lines 15-65).

Regarding claim 26, argument analogous those presented for claim 1 are applicable to claim 26 as discloses by Bouguet as follow extracting temporal information from said moving shadow and using said temporal information to determine a plurality of times (column 5, lines 15- 65);

obtaining an image of the moving shadow at each of the plurality of times (column 5, lines 60-65);

determining a relationship between the image and the three- dimensional surface at each of the plurality of times (column 5, lines 60-65); and

converting said image into information indicative of the three-dimensional surface (column 5, lines 15-65).

As to claim 27, Bouguet discloses a method wherein each image includes a line of the shadow, including a plurality of points p , which represent points P on the three-dimensional surface (column 5, lines 15-65).

As to claim 28, Bouguet discloses a method wherein said converting comprises triangulating between a reference plane of an imaging object and a reference plane of the three dimensional surface (column 3, lines 25-31).

As to claim 29, Bouguet discloses a method wherein said triangulating includes determining a position of a light source, and determining a reference plane between

Art Unit: 2625

said light source and a line of the moving shadow (column 4, line 39 through column 5, line 2).

As to claim 30, Bouguet discloses a method wherein said converting comprises determining positions of horizontal and vertical reference planes and triangulating using said positions (column 3, lines 44-58).

As to claim 31, Bouguet discloses a method wherein said determining positions comprise determining positions of at least one plane by a calibration operation (column 5, lines 8-15).

As to claim 32, Bouguet discloses a method wherein said determining a position of a light source comprises using an object of known height (note, depth is considered to be height of shadow) to triangulate a position of a light source, by obtaining a shadow of the object of known height (column 2, lines 59- 67).

As to claim 33, Bouguet discloses a method wherein said converting comprises converting the information obtained into dual space, and calculating the values obtained in the dual space representation (column 4, lines 38- 66).

As to claim 34, Bouguet discloses a method wherein said converting comprises determining three-dimensional information about three points in the image, and determining all other points from said determining three points (column 3, lines 58- 67, column 5, lines 15- 42, 56- 66 through column 6, line 20).

As to claim 35, Bouguet discloses a method wherein said obtaining comprises using a camera to obtain said image, and wherein said converting comprises determining information about the camera reference plane and converting said image

Art Unit: 2625

using said information about the camera reference plane (column 3, lines 56- 67, column 6, lines 1-20).

As to claims 37 and 44, Bouguet discloses an apparatus wherein said processor carries out an operation to determine information in two orthogonal shadow planes, and determining a position of a light source automatically from said information in said two orthogonal shadow planes (column 4, lines 39- 67).

As to claim 38, Bouguet discloses an apparatus further comprising a memory, associated with said processor storing information obtained from camera calibration (camera has processor which stores information of object and then transmits to computer, a computer programmed and operated to calculate points in space to represent the surface by triangulation, column 1, lines 18- 21, column 3, lines 44- 48, column 7, lines 41-48).

As to claims 39 and 50, Bouguet discloses an apparatus wherein said information stored in said memory (column 1, lines 18-21) comprises ground plane information (column 3, lines 25- 33).

As to claims 40 and 51, Bouguet discloses an apparatus wherein said memory also stores information indicative of a length of a device used to produce said moving shadow (abstract, column 4, lines 50- 59).

As to claim 41, Bouguet discloses an apparatus wherein said memory also stores information about a profile of brightness intensity (column 6, lines 1-67).

As to claim 42, Bouguet discloses an apparatus wherein said memory also stores information about a threshold of brightness intensity (column 6, lines 55-64).

As to claims 43 and 49 Bouguet discloses an apparatus wherein said memory stores information about a location of a light source (column 3, lines 25- 48).

As to claims 45 and 52, Bouguet discloses an apparatus wherein said processor processes only pixels of the image which have intensity values greater than said specified threshold (column 6, lines 55-64).

As to claim 46, Bouguet discloses an apparatus wherein said processor uses said information in the memory to transform between an image plane of said camera and an actual plane comprising the three-dimensional scene (column 3, lines 44 – 48, column 4, lines 39- 59).

Regarding claim 47, argument analogous those presented for claim 1 are applicable to claim 47 as discloses by Bouguet as follow use calibration information to determine information about the actual plane of the three-dimensional scene based on the transformation between the image plane of the device acquiring the two-dimensional image, and the three-dimensional scene, wherein said instruction include instruction to determine information in two orthogonal shadow planes, and to determine a position of a light source automatically from said information in said two orthogonal shadow planes (column 4, lines 39-67);

As to claims 54 and 57, Bouguet discloses a method wherein said determining the profile comprises determining both spatial information and time information of the profile, and said determining an edge of the shadow uses both said spatial and temporal information (column 5, lines 15- 42, 56- 65).

Art Unit: 2625

As to claims 56 and 59, Bouguet discloses a method wherein said determining comprises calculating values in dual space (column 4, lines 38- 68).

As to claim 60, Bouguet discloses a method wherein said converting comprises determining both temporal information about the moving shadow and shadow information about the moving shadow at times based on information within said temporal information, and determining said three-dimensional information based on both the shadow information and the temporal information by determining shadow information at each of a plurality of times (column 5, lines 15-42, 56- 65).

As to claim 61, Bouguet discloses an apparatus wherein said processor also operates to determine a profile of the shadow as it moves, and to determine an edge of the shadow by using information from said profile (column 6, lines 1-67, column 7, lines 40-56).

As to claim 62, Bouguet discloses an apparatus wherein said processor determines both spatial and temporal information about the profile and determines the edge of the shadow using both said spatial and temporal information (column 5, lines 15- 42, 56- 65).

As to claim 63, Bouguet discloses a medium, wherein said instructions further comprising instructions to determine a profile of the shadow image as it moves, including at least intensity information about the moving shadow, and using information in the profile to determine an edge of said shadow (column 4, lines 39- 67, column 5, lines 15- 65).

Art Unit: 2625

As to claim 64, Bouguet discloses a medium wherein said profile also includes temporal information, and both said intensity information and said temporal information are used to determine said edge of said shadow (column 5, lines 15- 65, column 6, lines 1-67)

Allowable Subject Matter


4. Claims 53, 55 and 58 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Contact Information

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sheela C Chawan whose telephone number is 703-305-4876. The examiner can normally be reached on Monday - Thursday 8 - 6.30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on 703-308-5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Sheela Chawan
Patent Examiner
Group Art Unit 2625
Jan 21, 2005